



Publication rates of endodontics specialization theses defended between 2015 and 2022: A bibliometric analysis

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Purpose: Theses in dentistry that focus on specialized areas play a significant role in academic education. This study aims to examine the theses written in the field of endodontics and investigate the parameters related to their publication rates, shedding light on both the consultants who supervise these theses and the students who take part in the thesis preparation process.

Methods: Theses defended between 2015 and 2022 were evaluated. The dates of submission of the theses, types of research, titles of the supervisor faculty members, subjects, and publication status of the theses were evaluated using PubMed, Google Scholar, and Dergi Park. Chi-square statistical analysis was performed.

Results: Out of 434 specialty theses, 53 (12.21%) were published in national journals and 83 (19.12%) in international journals, totaling 31.33%. Of the 434 theses, 68 (15.66%) were published in SCI-E/ESCI indexed journals, 48 (11.05%) in TR indexed journals, 4 (0.92%) in other national journals, and 10 (2.3%) in other internationally indexed journals.

Conclusion: In order to increase the rate of theses turned into scientific articles, advisors of theses should encourage their research assistants to publish their work.

Keywords: Endodontics specialization thesis; publication rate; SCIE/ESCI; thesis.

Introduction

Endodontics is a specialized area of dentistry that focuses on addressing issues related to the dental pulp and periapical tissue, including their respective ailments, preventative measures, and therapeutic interventions. Endodontics, which started with the aim of relieving toothache, has reached its current scientific level by passing through different stages in history (1). The first canal filling is attributed to Edward Hudson. Adolf Witzel has the honor of

being the first to treat the crown and root pulp rationally (2). In our history, the first application in the sense of endodontics was made by the Turkish physician Şerafeddin Sabuncuoğlu using the physical cauterization method during the Fatih period. The education of endodontic science, which has gone through various stages, started scientifically in 1909 in our country. The modern era of endodontics in our country and in the world started in 1943 (3). In 1963, endodontics was recognized as a science by the ADA (4).

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According to the exam results in the field of endodontics among dental clinics in Turkey, acquiring expertise through specialized training is dependent on displayed proficiency. Endodontics expertise encompasses a three-year postgraduate training program that follows dentistry faculty education. Writing a thesis is an important part of specialty education. It is mandatory for the specialty student to prepare a thesis in order to take the specialty education graduation exam and graduate (5). During thesis writing, specialization students acquire research skills, and these skills will guide them in their professional lives (6).

Specialization theses are considered a great opportunity for scientific research. Ensuring an increase in the quality of theses as well as their number is very important in terms of our country's place in the international scientific arena. In Turkey, there is no adequate follow-up system on whether theses are turned into scientific publications (6).

Theses completed during the specialization process do not have to be published in a scientific journal (7). However, publishing a thesis in scientific journals allows it to reach a wider audience. Theses that are not converted into scientific articles cannot be fully transferred to the public and scientific community (8). In addition, publishing theses as articles provides a source of data on the scientific quality level of the Higher Education Institution (7).

Bibliometric analysis is one of the scientific methods used to evaluate scientific literature (9,10). In this method of analysis, all micro and macro publication models are quantitatively evaluated with the help of mathematical and statistical calculations (11). This method of analysis became popular after 1980 because it can analyze scientific publications and information, making it easier to track the literature (12). The development of computer technologies and the increasing use of the internet have made this method widespread after the 2000s (11). In bibliometric analyses, it is known that theses are examined separately from other types of scientific research. Analyzing theses rather than other types of research is seen as an important way to determine scientific field trends (9). With this analysis technique, it is possible to identify the topics most frequently examined by experts in the field, as well as to identify neglected topics. In addition, the results of these data can provide guidance for the planning of further studies (9). On the other hand, the research evolution of institutions in our country can be determined, and a comparison of our country with other countries can be made (13).

Numerous studies have reported on the publication rates of theses in the fields of medicine and dentistry, which are limited in scope. In this study, the variability of the publication rates of theses over the years, the topics of the studies, whether there is a difference between the publi-

cation rates of theses produced in three major cities and other cities, the effect of academic titles of thesis advisors on the publication rates of theses, the rates of publication of theses in national or international journals, the thesis topics focused on, and the reasons for focusing on them were examined. Thus, it is aimed to guide both thesis advisors and specialty thesis students during thesis writing and preparation.

Materials and Methods

The present study was approved by the local ethical committee of Kahraman Maraş Sütçü İmam University (2024/07). The research adhered to the Strengthening of Reporting of Observational Studies in Epidemiology (STROBE) checklist for cross-sectional investigations.

Data collection

In the study, specialty theses in the field of endodontics were scanned from the website of the National Thesis Center of the Council of Higher Education. Since the first graduates of endodontic specialty education were given in 2015, this date was taken as the starting point. In order to compare the data of specialty students and considering the publication periods of the theses, the theses to be examined were limited to those up to 2022. Theses between 2015 and 2022 were screened, and 447 specialty theses were identified. Thirteen of the theses were excluded from the study because they did not have a thesis number, although they were shown on the website of the National Thesis Center of the Council of Higher Education. A total of 434 theses were included in the study.

Data analysis

For qualitative analysis, the title, abstracts, and keywords were used to identify the type of study, research themes, and trends. The theses included in the study were grouped under five headings according to research types: archive review, laboratory study, clinical study, survey study, and animal experiment study. Theses were classified according to their topics as pulp structure, diseases and treatments; root canal morphologies, access cavity; working length determination; Ni-Ti instruments; root canal irrigation methods and solutions; root canal medicaments and paste; canal filling techniques; retreatment; regenerative endodontic treatment; laser in endodontics; coronal restoration and post; and other.

The dates of submission of the theses, types of research, titles of the supervisor faculty members, the universities where they were conducted, the subjects and publication status of the studies, and the gender of the research as-

sistant who conducted the theses were recorded. The publication status of the theses was evaluated using PubMed and Google Scholar search engines and by searching author names, advisor names, and thesis titles in Turkish and English through Dergi Park. Published theses were analyzed according to the scope of the journals as SCIE/ESCI indexed journals, other national journals, other international journals, TR Index, and PubMed.

Statistical analysis

Categorical variables were written as numbers and percentages. Since qualitative data were evaluated, normal distribution was not checked. Chi-square test and Fisher's exact statistical analysis were performed using IBM SPSS 26.0 (SPSS Inc., Chicago, USA) program.

Results

There were 434 theses written by authors who completed their education between 2015 and 2022 and included in the study. It was observed that 136 of the theses, both

national and international, were published in a scientific journal (Table 1). Out of 434 specialty theses, 53 (12.21%) were published in national journals and 83 (19.12%) in international journals, totaling 31.33%. Of the 434 theses, 68 (15.66%) were published in SCIE/ESCI-indexed journals, 49 (11.28%) in TR-indexed journals, 4 (0.92%) in other national journals, and 15 (3.45%) in other internationally indexed journals (Table 2).

The publication rates of theses according to years are shown in Table 3. The highest percentage of publications among specialization theses belongs to 2015. When the distribution of the publication percentages of specialty theses according to years was analyzed, a statistically significant difference was observed ($p = 0.001$).

When the theses were evaluated according to research types, 62 (14.28%) were clinical studies, 32 (7.37%) were archive reviews, 316 (72.81%) were laboratory studies, 20 (4.6%) were survey studies, and 4 (0.92%) were animal experiment studies (Table 4). In terms of both numerical and proportional data, it was observed that the majority

Table 1. Publication status of articles in international and national journals

| Journal of types | Number of theses | Percentage of publications (%) |
|------------------------|------------------|--------------------------------|
| National journals | 53 | 12.21 |
| International journals | 83 | 19.12 |
| Total | 136 | 31.33 |

Table 2. Number of publications of theses according to journal types

| Journal of types | Number of theses | Percentage of publications (%) |
|-----------------------------|------------------|--------------------------------|
| SCIE/ ESCI indexed journals | 68 | 15.66 |
| National journals | 4 | 0.92 |
| International journals | 15 | 3.45 |
| TR Index | 49 | 11.28 |
| Total | 136 | 31.33 |

Table 3. Publication status of theses by year

| Thesis year | Number of theses | Number of publications | Percentage of publications (%) | p |
|-------------|------------------|------------------------|--------------------------------|---------|
| 2015 | 19 | 11 | 57.89 | p=0.001 |
| 2016 | 26 | 12 | 46.15 | |
| 2017 | 36 | 12 | 33.33 | |
| 2018 | 40 | 14 | 35 | |
| 2019 | 40 | 19 | 47.5 | |
| 2020 | 55 | 18 | 32.7 | |
| 2021 | 106 | 30 | 28.3 | |
| 2022 | 112 | 20 | 17.85 | |
| Total | 434 | 136 | 31.33 | |

of theses were laboratory studies and clinical studies. The number of theses according to research types is shown in Table 5. When the published specialty theses were evaluated according to the types of research, a statistically significant difference was found between the types of research being publications in national and international journals as a result of the chi-square statistical analysis ($p = 0.001$). When the theses were evaluated according to their subjects, there were:

- 35 (20%) theses on pulp structure, diseases, and treatments,
- 23 (17.39%) theses on canal morphologies, access cavity,
- 8 (37.5%) theses on working length determination,
- 91 (31.86%) theses on Ni-Ti instruments,
- 94 (36.17%) theses on irrigation methods and solutions,
- 60 (36.66%) theses on canal medicaments and paste,
- 19 (15.78%) theses on canal filling techniques,
- 23 (17.39%) theses on retreatment,
- 13 (15.38%) theses on regenerative endodontic treatment,
- 14 (64.28%) theses on laser in endodontics,
- 21 (38.09%) theses on coronal restoration-post, and
- 33 (33.33%) theses on other topics (Table 6).

When the publication rates of the theses according to their topics were analyzed, it was seen that the publication

Table 4. Number of theses according to research types

| Research types | Number of theses | Percentage of theses (%) |
|-------------------------|------------------|--------------------------|
| Archive search | 32 | 7.37 |
| Laboratory work | 316 | 72.81 |
| Clinical study | 62 | 14.28 |
| Survey study | 20 | 4.6 |
| Animal experiment study | 4 | 0.92 |
| Total | 434 | 100 |

Table 5. Publication status of theses in journals according to research types

| Type of research | National journals | Percentage of publication (%) | International journals | Percentage of publication (%) |
|-------------------------|-------------------|-------------------------------|------------------------|-------------------------------|
| Archive search | 2 | 6.25 | 2 | 6.25 |
| Laboratory work | 44 | 13.92 | 59 | 18.6 |
| Clinical study | 3 | 4.83 | 21 | 33.8 |
| Survey study | 4 | 20 | 0 | 0 |
| Animal experiment study | 0 | 0 | 1 | 25 |
| Total | 53 | 12.21 | 83 | 19.12 |

Table 6. Classification of theses according to their subjects

| Topics | Number of theses | Number of publications | Publication Rate (%) | p |
|---|------------------|------------------------|----------------------|------------|
| Pulp structure, diseases and treatments | 35 | 7 | 20 | $p > 0.05$ |
| Root canal morphologies, access cavity | 23 | 4 | 17.39 | |
| Working length determination | 8 | 3 | 37.5 | |
| Ni-Ti instruments | 91 | 29 | 31.86 | |
| Irrigation methods and solutions | 94 | 34 | 36.17 | |
| Canal medicaments and paste | 60 | 22 | 36.66 | |
| Canal filling techniques | 19 | 3 | 15.78 | |
| Retreatment | 23 | 4 | 17.39 | |
| Regenerative endodontic treatment | 13 | 2 | 15.38 | |
| Laser in endodontics | 14 | 9 | 64.28 | |
| Coronal restoration-post | 21 | 8 | 38.09 | |
| Other | 33 | 11 | 33.33 | |
| Total | 434 | 136 | 31.33 | |

Table 7. Publication status of theses by province

| Cities | Number of theses | Number of publications | Publication rate (%) |
|------------------|------------------|------------------------|----------------------|
| Three big cities | 110 | 33 | 30 |
| Other cities | 324 | 103 | 31.79 |
| Total | 434 | 136 | 31.33 |

Table 8. Publication status of theses by gender

| Gender | Number of theses | Number of publications | Publication rate (%) |
|--------|------------------|------------------------|----------------------|
| Female | 294 | 91 | 30.95 |
| Male | 140 | 45 | 32.14 |
| Total | 434 | 136 | 31.33 |

rate of the theses under the title of laser in endodontics (64.28%) was higher than the other topics. There was no statistically significant difference between the publication rates of theses and thesis topics ($p > 0.05$). The publication rates of theses according to their subjects are shown in Table 6.

The relationship between the academic titles of thesis advisors and the publication status of the theses they supervised is as follows:

- 50 (%) of 176 theses supervised by Professors (Prof.),
- 59 (%) of 163 theses supervised by Associate Professors (Assoc. Dr.),
- 12 (%) of 30 theses supervised by Assistant Professors (Assist. Prof.), the old title, and
- 15 (25.8%) of 65 theses supervised by Assistant Professors New (Assist. Prof.) (The title was altered from “Yardımcı Doçent” to “Doktor Öğretim Üyesi” by decision date March 6, 2018, with the Law on Amendments to the Higher Education Law No. 7100 and Certain Laws and Decree Laws).

There was no statistically significant difference between the academic titles of the advisors who supervised the specialty theses and the publication rates of the theses ($p > 0.05$).

In terms of the publication rates of theses, the three largest provinces (Istanbul, Ankara, Izmir) were compared with other provinces. A total of 33 out of 110 theses (30%) from the three big cities and 103 out of 324 theses (31.79%) from other cities were converted into publications. There was no statistically significant difference in the distribution of the publication percentages of specialty theses between cities ($p > 0.05$). The distribution of articles for the three major cities (Istanbul, Ankara, Izmir) and other provinces is shown in Table 7.

When the relationship between the rates of converting

theses into articles and gender was analyzed, 32.14% of male physicians and 30.95% of female physicians converted their theses into publications (Table 8). When the number of physicians who chose endodontics as their specialty was examined, it was found that the number of female physicians was higher than the number of male physicians. Although more female physicians turned their theses into publications, the difference was not statistically significant ($p > 0.05$).

Discussion

According to the Regulation on Specialization in Dentistry in Turkey, specialty students are obliged to prepare and defend a thesis in their field at the end of their training program. Publishing theses is the best way to share knowledge and increase accessibility (14).

In our study, theses published from 2015 to 2022 were examined, and it was seen that 31.33% of the theses were converted into articles. When other studies on this subject were examined, it was seen that the rates were similar (15-17). When some studies from around the world are examined, 17% of medical theses are published in France and 23.8% in Finland (18,19). Although the rate of conversion of theses into scientific articles is similar in our study and other studies, it is quite low, and it is seen that the problem of producing scientific publications from theses is not limited to Turkey. In a study examining the causal role of inadequate conversion to scientific articles, a significant difference was found between the groups with and without an academic career in terms of the publication of thesis work (6). As stated by Hollman et al. (20), the reasons for low publication rates in dentistry include lack of time, difficulty in publishing in SCI and SCI-E indexed journals, poor content of theses, and physicians' perception of theses as a necessity to obtain specialization. Factors such as lack of knowledge and experience in article writing, fewer opportunities for scientific education, lack

of foreign language skills (as many journals are published in English), and insufficient encouragement from thesis advisors may prevent the conversion of theses into articles. Detailed studies are needed to investigate the reasons for the insufficient rate of conversion of theses into publications.

Of all theses, 15.66% were published in SCI/SCI-E journals, 0.92% in national indexed journals, 2.3% in other international indexed journals, and 11.05% in TR-Dizin indexed journals (Table 2). Publication rates in national journals are lower than in international journals. It is thought that the high rate in international indexed journals may be due to the fulfillment of requirements for associate professorship criteria. However, with the updated criteria, it is predicted that these rates will change with the increase in the publication requirement in national journals (21).

When the theses were evaluated according to research types, the top three in terms of number were laboratory studies (72.81%), clinical studies (14.28%), and archive reviews (7.37%), respectively (Table 5). When the published specialization theses were evaluated according to the types of research, a statistically significant difference was found in the types of research being published in national and international journals as a result of the chi-square statistical analysis. Looking at the ranking of publication rates, it was seen that laboratory studies had the highest rate in national and international journals. This may be related to the high rate of new materials and technologies emerging in endodontics in recent years and the need for research on these materials. In addition, the integration of technological developments, which have been rising in the field of endodontics, into the department offers many working areas to physicians (22).

In the 20th century, the experimental use of animals led to major advances in science and medicine. The use of animals in biomedical and behavioral research, education, and testing should aim to improve the quality of biomedical research and advance biological knowledge for the benefit of living beings, taking into account the protection of animal rights and ethical principles. The use of animals for research and education should always be ethical (23). In experimental research, adherence to the principles of methodology and good laboratory practice is essential to achieve meaningful results. When planning research, the researcher should first consider using techniques that are alternatives to animal experiments. If a suitable alternative to animal use cannot be found, the research animal should be used in accordance with ethical rules (23). When all this information is evaluated, the low rate of animal studies, the relative difficulty of conducting animal studies,

ethical rules, and the high number of outpatients may have led physicians to conduct human studies. With the short duration of specialization, it is thought that physicians are more oriented toward laboratory work.

When the subjects studied are examined, theses were mostly published on Ni-Ti instruments and irrigation solutions and methods. It is natural to concentrate on these two topics, which are almost the foundation of endodontics. In addition, with the introduction of Ni-Ti instruments into endodontics, many file systems have been introduced in a very short period of time, prompting physicians to conduct research on this subject. Irrigation activation methods are very important for endodontics, and we think that it is the second most preferred subject because it is the basis of microorganism elimination together with shaping. With the development of new disinfection systems and the use of lasers in endodontics, although only 14 theses were conducted on lasers, 9 of these theses were published, making it the subject with the highest publication rate (Table 6). The use of lasers in endodontics is another method utilized in the process of cleaning root canals from microorganisms. The low number of theses can be attributed to the cost of laser devices and the inadequacies in providing them to faculties.

Thesis advisors are another important element in the transformation of theses into publications. In our study, the theses with the highest publication rate were conducted under the supervision of Assist. Prof., with a rate of 40% for specialty students. Assoc. Prof. ranked second with a publication rate of 36.19%. Another interesting result of our study is that doctoral faculty members have the lowest rate, 23.07%, in the conversion of theses into publications. In their study on psychiatry theses, Erim and Petekkaya (2020) found that the theses with the highest percentage of publications were supervised by Assist. Prof. with a rate of 67.2% (24). This result is consistent with our study. This may be attributed to the need to publish in order to be awarded the title of associate professor and, accordingly, to the fact that research assistants are encouraged to publish more.

The publication rates of universities in the three largest provinces (30%) and the publication rates of universities in other provinces (31.79%) were found to be close to each other. Although there are more professors in the academic staff in the three large provinces and they are more experienced, it is thought that the need to publish for the academic careers of consultants at the Assist. Prof. and Assoc. Prof. levels, which are more numerous in other provinces, may be a factor in balancing this situation. With the revised associate professorship criteria, it is predicted that this difference will increase as the obligation for academics

to publish is heightened (21).

In addition, the difference between the publication rates of theses according to years should also be taken into consideration (Table 3). The highest percentage of publications among specialization theses belongs to 2015. The lowest percentage of publications belongs to 2022, with 17.85%. When the distribution of the publication percentages of specialization theses according to years is analyzed, a statistically significant difference is observed. Considering that the average time taken for the publication of thesis contents is 2.95 ± 2.49 years, the higher rate of publication of theses written in 2015 was an expected result and is consistent with our study (12).

When the relationship between the rate of converting theses into articles and gender is analyzed, the rate of conversion into publications is close between male and female physicians (Table 8). However, when the number of physicians who chose endodontics as their specialty was examined, it was found that the number of female physicians was higher than the number of male physicians. Additional studies are needed to investigate the differences between the reasons for preference.

It is understood that there are several factors that determine the quality and scientific value of endodontic theses. In this context, considering the criteria for academic appointment and promotion, thesis advisors play a major role in the motivation of the student preparing the thesis, the completion of the thesis, and its transformation into a scientific publication (11).

In our study, a total of 434 theses produced by endodontic specialty students between 2015 and 2022 were analyzed one by one. For categorization purposes, it was found more appropriate to include only the theses produced by endodontic specialty thesis students. A wide range of topics, such as the rate of publication of theses and the journals in which they were published, the indexability of the journals, the academic titles of advisors, research types, study topics, female-male ratios, and the cities where they were conducted, are presented. When the theses were analyzed, it was seen that some of the theses included several topics. Such theses are basically classified according to the subject covered. By including a gender section in the study, it was aimed to compare the ratio of men and women who prefer the specialty of endodontics and to investigate the effect of gender role on the rate of publication of theses. The cities where the theses were conducted can be examined more broadly according to universities.

The limitations of our study are as follows: first, post-doctoral theses were not considered. Second, theses completed before 2015 were not included. Finally, the study did not provide detailed information about the reasons

why the theses were not published.

Conclusion

As a result of the study, it was determined that 31.33% of the specialization theses were turned into scientific articles. In order to increase the rate of theses turned into scientific articles, thesis advisors should encourage their research assistants to publish their work. In addition, further studies are needed to understand other reasons underlying the low publication rates in endodontic theses.

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